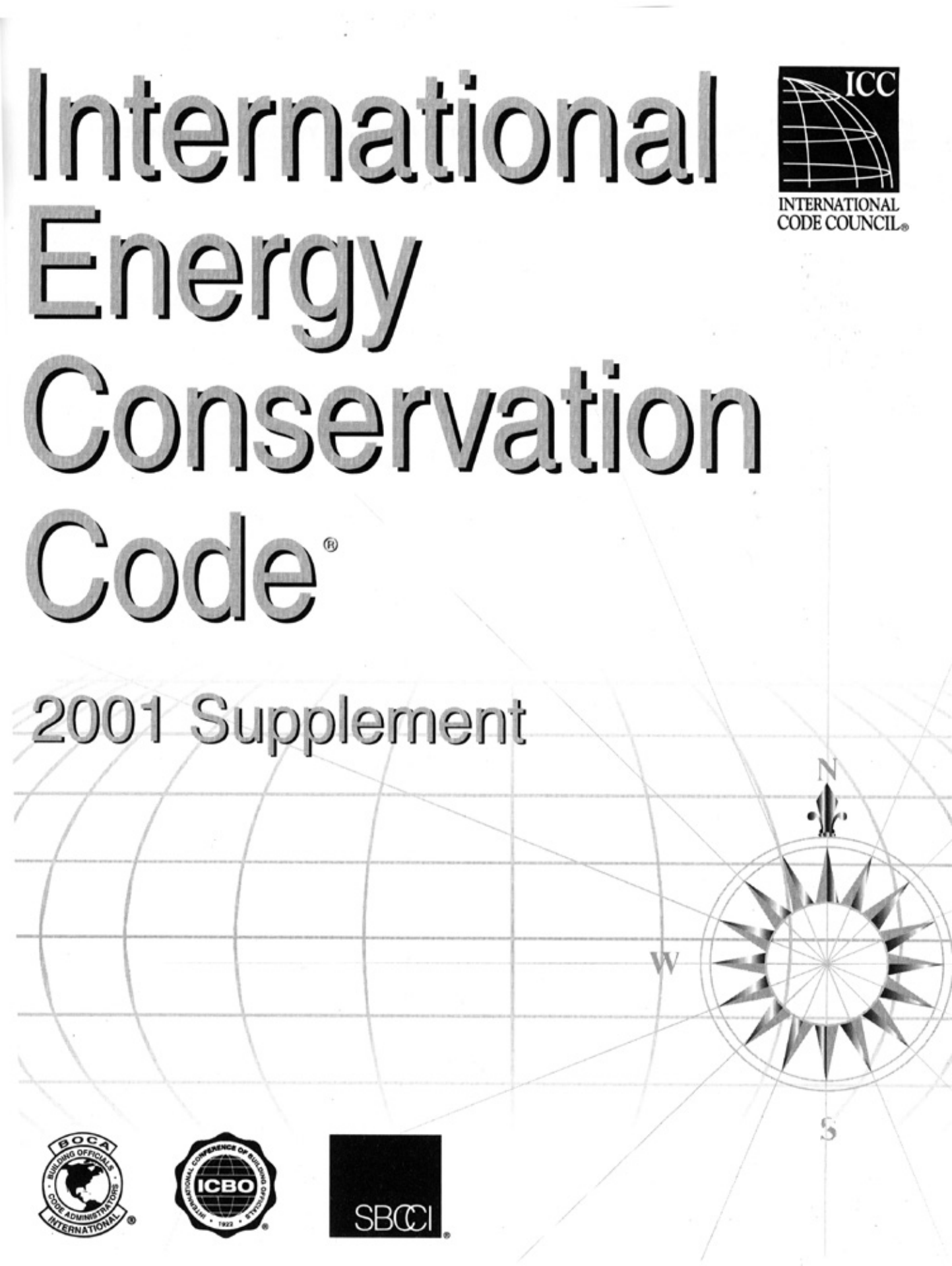
International Energy Conservation Code®

2001 Supplement



INTERNATIONAL ENERGY CONSERVATION CODE

CHAPTER 2

Section 202. Change to read as follows: (EC2-00)

EXTERIOR WALL. An above-grade wall enclosing conditioned space which is vertical or sloped at an angle of sixty (60) degrees (1.1 rad) or greater from the horizontal (see "Roof Assembly"). Includes between floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof, and basement walls with an average below-grade wall area which is less than 50 percent of the total opaque and non-opaque area of that enclosing side.

Section 202. Add new definition as follows: (EC28-00), (EC30-00)

SUNROOM ADDITION. A one-story structure added to an existing dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

Section 202. Add new definition as follows: (EC30-00)

THERMAL ISOLATION: A separation of conditioned spaces, between a sunroom addition and a dwelling unit, consisting of existing or new wall(s), doors, and/or windows. New wall(s), doors, and/or windows shall meet the prescriptive envelope component criteria in Table 502.2.5.

CHAPTER 3

Table 302.1. Change footnote 'b' to read as follows: (EC3-00)

[b]The degree days heating (base 65°F) and cooling (base 65°F) shall be selected from NOAA "Annual Degree Days to Selected Bases Derived from the 1961-1990 Normals", data available from adjacent military installations, or other source of local weather data acceptable to the Code Official.

CHAPTER 4

Section 402.1.1. Change to read as follows and add new sections: (EC6-00)

402.1.1 Standard design. A building designed in accordance with this chapter will be deemed as complying with this code if the calculated annual energy consumption is not greater than a similar building (defined as a "Standard design") whose enclosure elements and energy-consuming systems are designed in accordance with Chapter 5. Specific building envelope elements of the Standard design shall comply with Sections 402.1.1.1 through 402.1.1.4.

402.1.1.1 Exterior Walls. The exterior wall assembly *U*-Factors for the Standard design shall be selected by climate in accordance with Table 402.1.1(1).

402.1.1.2 Fenestration *U*-Factor. The fenestration system *U*-Factor used in the Standard design shall be selected by climate in accordance with Table 402.1.1(2).

402.1.1.3 Window Area. The window area of the Standard design, inclusive of the framed sash and glazing area, shall be equal to 18 percent of the conditioned floor area of the Proposed design.

402.1.1.4 Skylights. Skylights and other nonvertical roof glazing elements shall not be included in the Standard design, and ceiling *U*-factors used in the Standard design shall not include such elements in their computation.

Section 402.1.2.1. Add new section to read as follows: (EC7-00)

402.1.2.1 Orientation for groups of buildings. The worst possible orientation of the Proposed design, in terms of annual energy use, considering north, northeast, east, southeast, south, southwest, west, and northwest orientations, shall be used to represent a group of otherwise identical designs.

Section 402.1.3.1.1. Change to read as follows: (EC7-00)

402.1.3.1.1 Orientation, Standard design. As a minimum, equal areas on north, east, south, and west exposures shall be assumed.

Section 402.1.3.1.2. Delete section without substitution and renumber remaining sections. (EC7-00)

Sect. 402.1.3.2. Delete section without substitution. (EC8-00)

Section 402.1.3.3. Change to read as follows: (EC8-00)

402.1.3.3 Heat storage (thermal mass). The following input values, specific to heat storage (thermal mass), shall be used in calculating annual energy performance:

Internal mass 8 pounds per square foot (39kg/m^2)

Structural Mass 3.5 pounds per square foot (17 kg/m^2)

Section 402.1.3.4.3. Change to read as follows: (EC9-00)

402.1.3.4.3 Doors. The opaque door area of the Standard design shall equal that of the Proposed design and shall have a *U*-factor of 0.2 Btu/hr ft^2 °F [1.14 W/(m^2K)].

Section 402.1.3.5 and Table 402.1.3.5. Change to read as follows: (EC10-00)

402.1.3.5 Heating and cooling controls. Unless otherwise specified by local codes, heating and cooling thermostats shall comply with Table 402.1.3.5 for the Standard and Proposed designs. The input values, specific to heating and cooling controls, shall be used in calculating annual energy performance.

TABLE 402.1.3.5
HEATING AND COOLING CONTROLS

Parameter	Standard design value	Proposed design value
Heating	68°F	68°F
Cooling	78°F	78°F
Set back/set up	5°F	Maximum of 5°F
Set back/set up duration	6 hours per day	Maximum of 6 hours per day
Number of set-back/set up periods per unit[a]	1	Maximum of 1
Maximum number of zones per unit[a]	2	2
Number of thermostats per zone	1	1

SI: °C = [(°F) -32]/1.8
a. Units = Number of living units in Standard and Proposed design.

Section 402.1.3.8. Change to read as follows: (EC11-00)

402.1.3.8 Site weather data constants). The typical meteorological year (TMY2), or its "Ersatz" equivalent, from the National Oceanic and Atmospheric Administration (NOAA), or an approved equivalent, for the closest available location shall be used.

Section 402.1.3.12. Add new section as follows: (EC12-00)

402.1.3.12 Heating and cooling system equipment efficiency, Standard design. The efficiency of the heating and cooling equipment shall meet but not exceed the minimum efficiency requirement in Section 503.2. Where the proposed design utilizes an electric resistance space heating system as the primary heating source, the Standard design shall utilize an air-cooled heat pump that meets but does not exceed the minimum efficiency requirements in Section 503.2.

Exception: Zonal electric resistance space heating equipment in buildings in Climate Zones 1a through 4b as indicated in Table 302.1

Section 403 and 403.1. Change to read as follows: (EC13-00)

SECTION 403
SYSTEMS ANALYSIS FOR RENEWABLE ENERGY SOURCES

403.1 General. A proposed building utilizing solar, geothermal, wind or other renewable energy sources for all or part of its energy source shall meet the requirements of Section 402, except that the provisions of this section shall also apply.

Section 403.1.1 and Table 403.1.1. Add new section and new table to read as follows: (EC13-00)

403.1.1 Equivalent energy sources. The Standard design shall use energy sources as determined by Table 403.1.1.

TABLE 403.1.1
EQUIVALENT ENERGY SOURCES

Proposed design energy source		Standard design energy source	
Space heating	**Domestic water heating**	**Space heating**	**Domestic water heating**
Some renewable energy	Some renewable energy	Non-renewable energy source used in proposed space heating design	Non-renewable energy source used in proposed domestic water heating design
Some renewable energy	All renewable energy	Non-renewable energy source used in proposed space heating design	
All renewable energy	Some renewable energy	Non-renewable energy source used in proposed domestic water heating design	
All renewable energy	All renewable energy	Heat pump meeting requirements of Table 503.2	Electric water heater meeting requirements of Table 504.2

Section 403.1.1. Change section number and section to read as follows: (EC13-00)

403.1.2 Solar energy systems, active. To qualify under this section, solar energy must be derived from a specific collection and distribution system.

Section 403.1.1.1, 403.1.1.2, 403.1.2, 403.1.2.1, 403.1.2.2. Delete these sections without substitution. (EC13-00)

Section 403.1.3. Delete and substitute as follows: (EC13-00)

403.1.3 Solar energy systems, passive. To qualify under this section, space heating energy must be derived from the absorption of solar radiation by specific building materials and its release to the conditioned space.

Section 403.2. Change to read as follows: (EC13-00), (EC14-00)

403.2 Documentation. Proposed alternative designs submitted as requests for exception to the Standard design criteria shall be accompanied by an energy analysis, as specified in Section 402. The report shall provide technical detail on the alternative building and system designs and on the data employed in and resulting from the comparative analysis to verify that both the analysis and the designs meet the criteria of Sections 402 and 403. The energy derived from renewable energy sources shall be clearly identified in the report.

CHAPTER 5

Section 502.2. Change to read as follows: (EC18-00)

502.2 Heating and cooling criteria. The building envelope shall meet the provisions of Table 502.2. Compliance shall be demonstrated in accordance with Section 502.2.1, 502.2.2, 502.2.3, 502.2.4 or 502.2.5 as applicable. Energy measure trade-offs utilizing equipment exceeding the requirements of Section 503, 504 or 505 shall only use the compliance method(s) described in Chapter 4.

Section 502.2.1.2. Change to read as follows: (EC20-00)

502.2.1.2 Roof/ceiling. The combined thermal transmittance value (U_o) of the gross area of the roof or ceiling assembly shall not exceed the value given in Table 502.2. Equation 5-5 shall be used to determine acceptable combinations to meet this requirement.

$$U_O = \frac{(U_R x A_R) + (U_S x A_S)}{A_O}$$

(Equation 5-5)

where:

U_o = The average thermal transmittance of the gross roof/ceiling area.

A_o = The gross area of the roof/ceiling assembly

U_R = The combined thermal transmittance of the various paths of heat transfer through the opaque roof/ceiling area.

A_R = Opaque roof/ceiling assembly area.

U_S = The combined thermal transmittance of the area of all skylight elements in the roof/ceiling assembly (see Section 502.2.1.2.1).

A_S = The area (including frame) of all skylights in the roof/ceiling assembly (see Section 502.2.1.2.1).

Notes: (1) When more than one type of roof/ceiling or skylight is used, the U and A terms for those items shall be expanded into their subelements as:

$$(U_{RI}xA_{R1})+(U_{R2}xA_{R2})+...etc.$$

(Equation 5-6)

(2) Access doors or hatches in a roof/ceiling assembly shall be included as a subelement of the roof/ceiling assembly.

Section 502.2.1.2.1. Add new section as follows: (EC20-00)

502.2.1.2.1 Skylights. Skylight shafts, 12 inches (305 mm) in depth and greater, shall be insulated to no less than R-13 in climates 0-4,000 HDD and R-19 in climates greater than 4,000 HDD. The skylight shaft thermal performance shall not be included in the roof thermal transmission coefficient calculation.

Sec 502.2.1.5 and 502.2.3.5. Change to read as follows: (EC24-00)

502.2.1.5 Crawl space walls. If the floor above a crawl space does not meet the requirements of Section 502.2.1.3 and the crawl space does not have ventilation openings which communicate directly with the outside air, then the exterior walls of the crawl space shall have a thermal transmittance value not exceeding the value given in Table 502.2. Where the inside ground surface is 12 inches (305 mm) or greater below the outside finish ground level, insulation shall extend from the top of the wall to at least the inside ground surface [see Appendix Detail 502.2.1.5(1) and the DOE *Foundation Design Handbook*]. Where the inside ground surface is less than 12 inches (305 mm) below the outside finish ground level, insulation shall extend from the top of the crawl space wall to the top of the footing [see Appendix Detail 502.2.1.5(2) and the DOE *Foundation Design Handbook*].

502.2.3.5 Crawl space walls. If the floor above a crawl space does not meet the requirements of Section 502.2.3.3 and the crawl space does not have ventilation openings which communicate directly with the outside air, then the exterior walls of the crawl space shall have a thermal transmittance value not exceeding the value given in Table 502.2. The *U*-value of the exterior crawl space wall shall be determined by selecting the *U*-factor for the appropriate crawl space wall section for Appendix Table 502.2.3.5.Where the inside ground surface is 12 inches (305 mm) or greater below the outside finish ground level, insulation shall extend from the top of the wall to at least the inside ground surface [see Appendix Detail 502.2.1.5(1) and the DOE *Foundation Design Handbook*]. Where the inside ground surface is less than 12 inches (305 mm) below the outside finish ground level, insulation shall extend from the top of the crawl space wall to the top of the footing [see Appendix Detail 502.2.1.5(2) and the DOE *Foundation Design Handbook*].

Section 502.2.5. Change to read as follows: (EC28-00)

502.2.5 Prescriptive path for additions and window replacements. As an alternative to demonstrating compliance with Section 402 or 502.2, additions with a conditioned floor area less than 500 square feet (46.5 m^2) to existing single-family residential buildings and structures shall meet the prescriptive envelope component criteria in Table 502.2.5 for the designated heating degree days (HDD) applicable to the location. The *U*-factor of each individual fenestration product (windows, doors and skylights) shall be used to calculate an area-weighted average fenestration product *U*-factor for the addition, which shall not exceed the applicable listed values in Table 502.2.5. For additions, other than sunroom additions, the total area of fenestration products shall not exceed 40 percent of the gross wall and roof area of the addition. The *R*-values for opaque thermal envelope components shall be equal to or greater than the applicable listed values in Table 502.2.5. Replacement fenestration products (where the entire unit, including the frame, sash and glazing, is replaced) shall meet the prescriptive fenestration *U*-factor criteria in Table 502.2.5 for the designated HDD applicable to the location. Conditioned sunroom additions shall be served by a separate heating or cooling system, or shall be controlled as a separate zone of the existing system. Fenestration products used in additions and as replacement windows in accordance with this section shall also meet the requirements of Section 502.1.5 in locations with HDD less than 3,500.

Exception: Replacement skylights shall have a maximum *U*-factor of 0.50 when installed in any location above 1,999 HDD.

Table 502.2.5. Add new footnote 'e' as follows: (EC30-00)

Fenestration U-factor[e]

[e] Sunroom additions that maintain thermal isolation shall be required to have a maximum *U*-factor of 0.50 in locations ≥ 2,000 HDD.

Section 503.1. Change to read as follows: (EC32-00) (EC33-00)

503.1 General. This section covers mechanical systems and equipment used to provide heating, ventilating and air-conditioning functions. This section assumes that the residential building and dwelling units therein will be designed with individual HVAC systems. Where equipment not shown in Table 503.2 is specified, it shall meet the provisions of Sections 803.2.2 and 803.3.2.

Table 503.3.3.1. Change table to read as follows: (EC34-00)

Low temperature - 106-200

Table 503.3.3.3. Delete table and substitute, revise table notes to read as follows: (EC35-00)

TABLE 503.3.3.3
MINIMUM DUCT INSULATION[a]

ANNUAL HEATING DEGREE DAYS	Insulation *R*-value (h· ft²·°F.)/Btu[d]			
	Ducts in unconditioned attics or outside building		Ducts in unconditioned basements, crawl spaces, garages, and other unconditioned spaces[c]	
	Supply	Return	Supply	Return[b]
Below 1,500	8	4	4	0
1,500 to 3,500	8	4	6	2
3,501 to 7,500	8	4	8	2
Above 7,500	11	6	11	2

For SI: °C= [(°F)-32]/1.8, 1 (h·ft²·°F)/Btu= 0.176(m²·K)/W, 1 foot= 304.5mm

a. Insulation *R*-values shown are for the insulation as installed and do not include film resistance. The required minimum *R*-values do not consider water vapor transmission and condensation. Where control of condensation is required, additional insulation, vapor retarders, or both, shall be provided to limit vapor transmission and condensation. For ducts that are

designed to convey both heated and cooled air, duct insulation shall be as required by the most restrictive condition. Where exterior walls are used as plenums, wall insulation shall be as required by the most restrictive condition of this section.

b. Insulation on return ducts in basements is not required.

c. Unconditioned spaces include ventilated crawl spaces, ventilated attics, and framed cavities in those floor, wall and ceiling assemblies which (1) separate conditioned space from unconditioned space or outside air, and (2) are uninsulated on the side facing away from the condition space.

d. Insulation resistance measured on a horizontal plane in accordance with ASTM C 518, at a mean temperature of 75°F.

Section 503.3.3.3, 503.3.4.1, and 503.3.4.2. Change to read as follows:
(EC36-00)

503.3.3.3 Duct and plenum insulation. All supply and return-air ducts and plenums installed as part of an HVAC air-distribution system shall be thermally insulated in accordance with Table 503.3.3.3, or where such ducts or plenums operate at static pressures greater than 2 in. w.g. (500 Pa), in accordance with Section 503.3.3.4.1.

Exceptions:

1. Factory-installed plenums, casings or ductwork furnished as a part of the HVAC equipment tested and rated in accordance with Section 503.2.
2. Ducts within the conditioned space that they serve.

503.3.3.4.1 High and medium pressure duct systems. All ducts and plenums operating at static pressures greater than 2 in. w.g. (500 Pa) shall be insulated and sealed in accordance with Section 803.2.8. Ducts operating at static pressures in excess of 3 in. w.g. (750 Pa) shall be leak tested in accordance with Section 803.3.6. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

503.3.3.4.2 Low pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at static pressures less than or equal to 2 in. w.g. (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), masti-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures less than 2 in. w.g. (500 Pa) pressure classification.

CHAPTER 7

Section 701.1. Change to read as follows:
(EC33-00)

701.1 General. Commercial buildings shall meet the requirements of ASHRAE/IESNA *90.1*.

Exception: Commercial buildings that comply with Chapter 8.

CHAPTER 8

Section 801.2. Change to read as follows:
(EC33-00)

801.2 Application. The requirements in Sections 802, 803, 804, and 805 shall each be satisfied on an individual basis. Where one or more of these sections is not satisfied, compliance for that section(s) shall be demonstrated in accordance with the applicable provisions of ASHRAE/IESNA 90.1.

Section 802.1. Change to read as follows:
(EC33-00)

802.1 General. Walls, roof assemblies, floors, glazing, and slabs on grade which are part of the building envelope for buildings where window and glazed door area is not greater than 50 percent of the gross area of above-grade walls shall meet the requirements of Sections 802.2.1 through 802.2.8, as applicable. Buildings with more glazing shall meet the applicable provisions of ASHRAE/IESNA 90.1.

Section 802.2. Change to read as follows:
(EC33-00)

802.2 Criteria. The building envelope components shall meet each of the applicable requirements in Tables 802.2(1), 802.2(2), 802.2(3) and 802.2(4), based on the percentage of wall that is glazed. The percentage of wall that is glazed shall be determined by dividing the aggregate area of rough openings for glazing (windows and glazed doors) in all the above grade walls associated with the building envelope by the total gross area of all above grade exterior walls that are a part for the building envelope. In buildings with multiple types of building envelope construction, each building envelope construction type shall be evaluated separately. Where Table 802.2(1), 802.2(2), 802.2(3) and 802.2(4) does not list a particular construction type, the applicable provisions of ASHRAE/IESNA *90.1* shall be used in lieu of

Section 802.

802.3.3. Add new section to read as follows: (EC37-00)

802.3.3 Dampers integral to the building envelope. Stair, elevator shaft vents, and other dampers integral to the building envelope shall be equipped with motorized dampers with a maximum leakage rate of 3 cfm/ft^2 at 1.0 in w.g. (250 Pa) when tested in accordance with AMCA 500. Such dampers shall be closed during normal building operation and shall open as required by fire and smoke detection systems.

Exception: Gravity (non-motorized) dampers are permitted to be used in buildings less than three stories in height above grade.

Section 802.3.4. Add new section to read as follows: (EC38-00)

802.3.4 Loading dock weatherseals. Cargo doors and loading dock doors shall be equipped with weatherseals to restrict infiltration when vehicles are parked in the doorway.

Section 802.3.5. Add new section to read as follows: (EC39-00)

802.3.5 Vestibules. A door that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions:

1. Buildings in Climate Zones 1a through 4b as indicated in Table 302.1.
2. Doors not intended to be used as a building entrance door, such as doors to mechanical or electrical equipment rooms
3. Doors opening directly from a guest room or dwelling unit.
4. Doors that open directly from a space less than 3,000 ft^2 (298 m^2) in area.
5. Revolving doors
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

Section 802.3.6. Add new section to read as follows, and renumber remaining sections: (EC40-00)

802.3.6 Recessed lighting fixtures. When installed in the building envelope, recessed lighting fixtures shall meet one of the following requirements:

1. Type IC rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity and sealed or gasketed to prevent air leakage into the unconditioned space.
2. Type IC or non-IC rated, installed inside a sealed box constructed from a minimum 0.5-inch-thick (12.7 mm) gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other air-tight assembly manufactured for this purpose, while maintaining required clearances of not less than 0.5 inch (12.7 mm) from combustible material and not less than 3 inches (76 mm) from insulation material.
3. Type IC rated, in accordance with ASTM E283 admitting no more than 2.0 cfm (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. The lighting fixture shall be tested at 1.57 lbs./ft.^{2} (75 Pa) pressure difference and shall be labeled.

Section 803.2.6. Change to read as follows: (EC41-00)

803.2.6 Cooling with outdoor air. Each system over 65,000 Btu/h (19 kW) cooling capacity located in other than Climate Zones 1, 2, 3b, 5a or 6b as shown in Table 302.1 shall have an economizer that will automatically shut off the cooling system and allow all of the supply air to be provided directly from outdoors.

Economizers shall be capable of operating at 100% outside air, even if additional mechanical cooling is required to meet the cooling load of the building. Where a single room or space is supplied by multiple air systems, the aggregate capacity of those systems shall be used in applying this requirement.

Exceptions:

1. Where the cooling equipment is covered by the minimum efficiency requirements of Table 803.2.2(1) or 803.2.2(2) and meets the efficiency requirements of Table 803.2.6
2. Systems with air or evaporatively cooled condensers and which serve spaces with open case refrigeration or that require filtration equipment in order to meet the minimum ventilation requirements of Chapter 4 of the ICC International Mechanical Code.
3. Systems under 135,000 Btu/h (40 kW) cooling

capacity in Climate Zones 3c, 5b, 7, 13b, and 14.

Section 803.3.2. Change to read as follows:
(EC42-00)

803.3.2 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables 803.3.2(1) through 803.3.2(6) and Table 803.2.2(5), when tested and rated in accordance with the applicable test procedure. The efficiency shall be verified through certification under an approved certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions and/or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrate the combined efficiency of the specified components meets the requirements herein.

Where unitary or prepackaged equipment is used in a complex HVAC system and is not covered by Section 803.3.2, the equipment shall meet the applicable requirements of Section 803.2.2.

Exception: Equipment listed in Table 803.3.2(2) not designed for operation at ARI Standard test conditions of 44 °F (7 °C) leaving chilled water temperature and 85 °F (29 °C)entering condenser water temperature shall have a minimum full load COP and IPLV rating as shown in Tables 803.3.2(3) through 803.3.2(5) as applicable. The table values are only applicable over the following full load design ranges:

Leaving Chilled Water Temperature:	40 to 48 °F (4 °C to 9 °C)
Entering Condenser Water Temperature:	75 to 85 °F (24 °C to 29 °C)
Condensing Water Temperature Rise:	5 to 15 °F (-15 °C to -9 °C)

Chillers designed to operate outside of these ranges are not covered by this code.

Tables 803.2.2(1), 803.2.2(2), 803.2.2(3), 803.2.2(4), 803.2.2(5), 803.3.2(1), 803.3.2(2), 803.3.2(3). Delete existing tables in their entirety and substitute as follows:
(EC42-00)

TABLE 803.2.2 (1)
UNITARY AIR CONDITIONERS AND CONDENSING UNITS, ELECTRICALLY OPERATED, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[b]	EFFICIENCY AS OF 10/29/2001[b]	TEST PROCEDURE[a]
Air conditioners, air cooled	< 65,000 Btu/h[d]	Split system	10.0 SEER	10.0 SEER	ARI 210/240
		Single package	9.7 SEER	9.7 SEER	
	≥65,000 Btu/h and < 135,000 Btu/h	Split system and single package	8.9 EER[c]	10.3 EER[c]	
	≥135,000 Btu/h and < 240,000 Btu/h	Split system and single package	8.5 EER[c]	9.7 EER[c]	ARI 340/360
	≥ 240,000 Btu/h and <760,000 Btu/h	Split system and single package	8.5 EER[c] 7.5 IPLV[c]	9.5 EER[c] 9.7 IPLV[c]	
	>(760,000 Btu/h	Split system and single package	8.2 EER[c] 7.5 IPLV[c]	9.2 EER[c] 9.4 IPLV[c]	
Air Conditioners, water and evaporatively cooled	< 65,000 Btu/h	Split System and single package	9.3 EER	12.1 EER	ARI 210/240
	≥65,000 Btu/h and < 135,000 Btu/h	Split system and single package	10.5 EER[c]	11.5 EER[c]	
	≥ 135,000 Btu/h and 240,000 Btu/h	Split system and single package	9.6 EER[c]	11.0 EER[c]	ARI 340/360
	> 240,000 Btu/h	Split system and single package	9.6 EER[c] 9.0 IPLV[c]	11.0 EER[c] 10.3 IPLV[c]	

For SI: 1 Btu/hr = 0.2931 W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] IPLVs are only applicable to equipment with capacity modulation.

[c] Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

[d] Single-phase air-cooled air-conditioners < 65,000 Btu/h are regulated by the National Appliance Energy Conservation Act of 1987 (NAECA). SEER values are those set by NAECA..

TABLE 803.2.2 (2)
UNITARY AND APPLIED HEAT PUMPS, ELECTRICALLY OPERATED, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[b]	EFFICIENCY AS OF 10/29/2001[b]	TEST PROCEDURE[a]
Air cooled, (cooling mode)	< 65,000 Btu/h[d]	Split system	10.0 SEER	10.0 SEER	ARI 210/240
		Single package	9.7 SEER	9.7 SEER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	Split system and single package	8.9 EER[c]	10.1 EER[c]	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Split system and single package	8.5 EER[c]	9.3 EER[c]	ARI 340/360
	> 240,000 Btu/h	Split system and single package	8.5 EER[c] 7.5 IPLV[c]	9.0 EER[c] 9.2 IPLV[c]	
Water-source (cooling mode)	< 17,000 Btu/h	85°F entering water	9.3 EER		ARI 320
		86°F entering water		11.2 EER	ISO-13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h	85°F entering water	9.3 EER		ARI 320
		86°F entering water		12.0 EER	ISO-13256-1
	≥ 65,000 Btu/h and < 135,000 Btu/h	85°F entering water	10.5 EER		ARI 320
		86°F entering water		12.0 EER	ISO-13256-1
Groundwater-source (cooling mode)	< 135,000 Btu/h	70°F entering water 50°F entering water	11.0 EER 11.5 EER		ARI 325
		59°F entering water		16.2 EER	ISO-13256-1
Ground source (cooling mode)	< 135,000 Btu/h	77°F entering brine 70°F entering brine	10.0 EER 10.4 EER		ARI 330
		77°F entering water		13.4 EER	ISO-13256-1
Air cooled (heating mode)	< 65,000 Btu/h[d] (Cooling capacity)	Split system	6.8 HSPF	6.8 HSPF	ARI 210/240
		Single package	6.6 HSPF	6.6 HSPF	
	≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	3.0 COP	3.2 COP	
	>135,000 Btu/h (Cooling capacity)	47°F db/43°F wb outdoor air	2.9 COP	3.1 COP	ARI 340/360
Water-source (heating mode)	< 135,000 Btu/h (Cooling capacity)	70°F entering water	3.8 COP		ARI 320
		68°F entering water		4.2 COP	ISO-13256-1
Groundwater-source (heating mode)	< 135,000 Btu/h (Cooling capacity)	70°F entering water 50°F entering water	3.4 COP 3.0 COP		ARI 325
		50°F entering water		3.6 COP	ISO-13256-1
Ground source (heating mode)	< 135,000 Btu/h (Cooling capacity)	32°F entering brine	2.5 COP		ARI 330
		32°F entering water		3.1 COP	ISO-13256-1

For SI: °C = [(°F) - 32] / 1.8, 1 Btu/h = 0.2931W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] IPLVs and Part load rating conditions are only applicable to equipment with capacity modulation.

[c] Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

[d] Single-phase air-cooled heat pumps < 65,000 Btu/h are regulated by the National Appliance Energy Conservation Act of 1987 (NAECA). SEER and HSPF values are those set by NAECA.

TABLE 803.2.2.(3)
PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINAL HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[b]	EFFICIENCY AS OF 10/29/2001[b]	TEST PROCEDURE[a]
PTAC (cooling mode) new construction	All capacities	95°F db outdoor air	10.0 - (0.16 x Cap/1000) EER	12.5 - (0.213 x Cap/1000) EER	ARI 310/380
PTAC (cooling mode) replacements[c]	All capacities	95°F db outdoor air	10.0 - (0.16 x Cap/1000) EER	10.9 - (0.213 x Cap/1000) EER	
PTHP (Cooling mode) new construction	All capacities	95°F db outdoor air	10.0 - (0.16 x Cap/1000) EER	12.3 - (0.213 x Cap/1000) EER	
PTHP (cooling mode) replacements[c]	All capacities	95°F db outdoor air	10.0 - (0.16 x Cap/1000) EER	10.8 - (0.213 x Cap/1000) EER	
PTHP (heating mode) new construction	All capacities		2.9 - (0.026 x Cap/1000) COP	3.2 - (0.026 x Cap/1000) COP	
PTHP (heating mode) replacements[c]	All capacities		2.9 - (0.026 x Cap/1000) COP	2.9 - (0.026 x Cap/1000) COP	

For SI: °C = [(°F) - 32] / 1.8, 1 Btu/h = 0.2931W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7,000 Btu/h, use 7,000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

[c] Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16-in. (406 mm) high and less than 42-in. (1067 mm) wide.

TABLE 803.2.2(4)
WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[d]	EFFICIENCY AS OF 10/29/2001[d,e]	TEST PROCEDURE[a]
Warm air furnace, gas-fired	< 225,000 Btu/h		78% AFUE or 80% E_t[c]	78% AFUE or 80% E_t[c]	DOE 10 CFR Part 430 or ANSI Z21.47
	≥ 225,000 Btu/h	Maximum capacity[c]	80% E_t	80% E_c[f]	ANSI Z21.47
Warm air furnace, oil-fired	< 225,000 Btu/h		78% AFUE or 80% E_t[c]	78% AFUE or 80% E_t[c]	DOE 10 CFR Part 430 or UL 727
	≥ 225,000 Btu/h	Maximum capacity[b]	81% E_t	81% E_t[g]	UL 727
Warm air duct furnaces, gas-fired	All capacities	Maximum capacity[b] Minimum capacity[b]	78% E_t 75% E_t	80% E_c ——	ANSI Z83.9
Warm air unit heaters, gas-fired	All capacities	Maximum capacity[b] Minimum capacity[b]	78% E_t 74% E_t	80% E_c ——	ANSI Z83.8
Warm air unit heaters, oil-fired	All capacities	Maximum capacity[b] Minimum capacity[b]	81% E_t 81% E_t	80% E_c ——	UL 731

For SI: 1 Btu/h = 0.2931W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] Minimum and maximum ratings as provided for and allowed by the unit's controls.

[c] Combination units not covered by the National Appliance Energy Conservation Act of 1987 (NAECA) (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]) shall comply with either rating.

[d] E_t = Thermal efficiency. See test procedure for detailed discussion.

[e] E_c = Combustion efficiency (100% less flue losses). See test procedure for detailed discussion.

[f] E_c = Combustion efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

[g] E_t = Thermal efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

TABLE 803.2.2.(5)
BOILERS, GAS- AND OIL-FIRED, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE[f]	SIZE CATEGORY (INPUT)	SUB-CATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY[c,e]	EFFICIENCY AS OF 10/29/2001[d]	TEST PROCEDURE
Boilers, gas-fired	< 300,000 Btu/h	Hot water	80% AFUE	80% AFUE	DOE 10 CFR Part 430
		Steam	75% AFUE	75% AFUE	
	≥300,000 Btu/h and ≤2,500,000 Btu/h	Maximum capacity[b]	80% E_c	75% E_t	H.I. HBS 86
	> 2,500,000 Btu/h[f]	Hot water	80% E_c	80% E_c	
		Steam	80% E_c	80% E_c	
Boilers, oil-fired	< 300,000 Btu/h		80% AFUE	80% AFUE	DOE 10 CFR Part 430
	≥300,000 Btu/h and ≤2,500,000 Btu/h	Maximum capacity[b]	83% E_c	78% E_t	H.I. HBS 86
	> 2,500,000 Btu/h[f]	Hot water	83% E_c	83% E_c	
		Steam	83% E_c	83% E_c	
Oil-fired (Residual)	≥300,000 Btu/h and ≤2,500,000 Btu/h	Maximum capacity[b]	83% E_c	78% E_t	H.I. HBS 86
	> 2,500,000 Btu/h[f]	Hot water	83% E_c	83% E_c	
		Steam	83% E_c	83% E_c	

For SI: 1 Btu/h = 0.2931W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] Minimum and maximum ratings as provided for and allowed by the unit's controls.

[c] E_c = Combustion efficiency (100% less flue losses). See reference document for detailed information.

[d] E_t = Thermal efficiency. See reference document for detailed information.

[e] Alternate test procedures used at the manufacturer's option are ASME PTC-4.1 for units over 5,000,000 Btu/h input, or ANSI Z21.13 for units greater than or equal to 300,000 Btu/h and less than or equal to 2,500,000 Btu/h input.

[f] These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers, and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

TABLE 803.3.2 (1)
CONDENSING UNITS, ELECTRICALLY OPERATED, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	MINIMUM EFFICIENCY[b]	EFFICIENCY AS OF 10/29/2001[b]	TEST PROCEDURE[a]
Condensing units, air cooled	135,000 Btu/h	9.9 EER 11.0 IPLV	10.1 EER 11.2 IPLV	ARI 365
Condensing units, water or evaporatively cooled	135,000 Btu/h	12.9 EER 12.9 IPLV	13.1 EER 13.1 IPLV	

For SI: 1 Btu/h = 0.2931W

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] IPLVs are only applicable to equipment with capacity modulation.

TABLE 803.3.2(2)
WATER CHILLING PACKAGES, MINIMUM EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	MINIMUM EFFICIENCY[b]	EFFICIENCY AS OF 10/29/2001[b]	TEST PROCEDURE[a]
Air cooled, with condenser, electrically operated	< 150 tons	2.70 COP 2.80 IPLV	2.80 COP 2.80 IPLV	ARI 550 or ARI 590 as appropriate
	≥150 tons	2.50 COP 2.50 IPLV		
Air cooled, without condenser, electrically operated	All capacities	3.10 COP 3.20 IPLV	3.10 COP 3.10 IPLV	ARI 590
Water cooled, electrically operated, positive displacement (reciprocating)	All capacities	3.80 COP 3.90 IPLV	4.20 COP 4.65 IPLV	
Water cooled, electrically operated, positive displacement (rotary screw and scroll)	< 150 tons	3.80 COP 3.90 IPLV	4.45 COP 4.50 IPLV	ARI 550 or ARI 590 as appropriate
	≥150 tons and < 300 tons	4.20 COP 4.50 IPLV	4.90 COP 4.95 IPLV	
	≥300 tons	5.20 COP 5.30 IPLV	5.50 COP 5.60 IPLV	
Water cooled, electrically operated, centrifugal[c]	< 150 tons	3.80 COP 3.90 IPLV	5.00 COP 5.00 IPLV	ARI 550
	≥150 tons and < 300 tons	4.20 COP 4.50 IPLV	5.55 COP 5.55 IPLV	
	≥300 tons	5.20 COP 5.30 IPLV	6.10 COP 6.10 IPLV	
Air cooled absorption single effect	All capacities	0.48 COP	0.60 COP	
Water cooled absorption single effect	All capacities	0.60 COP	0.70 COP	
Absorption double effect, indirect-fired	All capacities	0.95 COP 1.00 IPLV	1.00 COP 1.05 IPLV	ARI 560
Absorption double effect, direct-fired	All capacities	0.95 COP 1.00 IPLV	1.00 COP 1.00 IPLV	

For SI: 1 Ton = 3.517 kW

[a] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

[b] The chiller equipment requirements do not apply for chillers used in low temperature applications where the design leaving fluid temperature is less than or equal to 40°F (4°C).

TABLE 803.3.2 (3)
COPS AND IPLVS FOR NON-STANDARD CENTRIFUGAL CHILLERS < 150 TONS

CENTRIFUGAL CHILLERS < 150 TONS COP_{std} = 5.4								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving chilled water temperature (°F)	Entering condenser water temperature (°F)	Lift[a] (°F)	Required COP and IPLV					
46	75	29	6.00	6.27	6.48	6.80	7.03	7.20
45	75	30	5.92	6.17	6.37	6.66	6.87	7.02
44	75	31	5.84	6.08	6.26	6.53	6.71	6.86
43	75	32	5.75	5.99	6.16	6.40	6.58	6.71
42	75	33	5.67	5.90	6.06	6.29	6.45	6.57
41	75	34	5.59	5.82	5.98	6.19	6.34	6.44
46	80	34	5.59	5.82	5.98	6.19	6.34	6.44
40	75	35	5.50	5.74	5.89	6.10	6.23	6.33
45	80	35	5.50	5.74	5.89	6.10	6.23	6.33
44	80	36	5.41	5.66	5.81	6.01	6.13	6.22
43	80	37	5.31	5.57	5.73	5.92	6.04	6.13
42	80	38	5.21	5.48	5.64	5.84	5.95	6.04
41	80	39	5.09	5.39	5.56	5.76	5.87	5.95
46	85	39	5.09	5.39	5.56	5.76	5.87	5.95
40	80	40	4.96	5.29	5.47	5.67	5.79	5.86
45	85	40	4.96	5.29	5.47	5.67	5.79	5.86
44	85	41	4.83	5.18	5.40	5.59	5.71	5.78
43	85	42	4.68	5.07	5.28	5.50	5.62	5.70
42	85	43	4.51	4.94	5.17	5.41	5.54	5.62
41	85	44	4.33	4.80	5.05	5.31	5.45	5.53
40	85	45	4.13	4.65	4.92	5.21	5.35	5.44
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

For SI: °C = [(°F) - 32] / 1.8

[a] Lift = Entering condenser water temperature °F – Leaving chilled water temperature °F

[b] Condenser DT = Leaving condenser water temperature °F – Entering condenser water temperature °F

$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)$

where X = Condenser DT + Lift

$COP_{adj} = K_{adj} * COP_{std}$

Tables 803.3.2(4), 803.3.2(5) and 803.3.2(6). Add new tables as follows: (EC42-00)

TABLE 803.3.2 (4)
COPs AND IPLVS FOR NON-STANDARD CENTRIFUGAL CHILLERS > 150 TONS, ≤ 300 TONS

CENTRIFUGAL CHILLERS > 150 Tons, ≤ 300 Tons COP_{std} = 5.55								
			CONDENSER FLOW RATE					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving chilled water temperature (°F)	Entering condenser water temperature (°F)	Lift[a] (°F)	Required COP and IPLV					
46	75	29	6.17	6.44	6.66	6.99	7.23	7.40
45	75	30	6.08	6.34	6.54	6.84	7.06	7.22
44	75	31	6.00	6.24	6.43	6.71	6.90	7.05
43	75	32	5.91	6.15	6.33	6.58	6.76	6.89
42	75	33	5.83	6.07	6.23	6.47	6.63	6.75
41	75	34	5.74	5.98	6.14	6.36	6.51	6.62
46	80	34	5.74	5.98	6.14	6.36	6.51	6.62
40	75	35	5.65	5.90	6.05	6.26	6.40	6.51
45	80	35	5.65	5.90	6.05	6.26	6.40	6.51
44	80	36	5.56	5.81	5.97	6.17	6.30	6.40
43	80	37	5.46	5.73	5.89	6.08	6.21	6.30
42	80	38	5.35	5.64	5.80	6.00	6.12	6.20
41	80	39	5.23	5.54	5.71	5.91	6.03	6.11
46	85	39	5.23	5.54	5.71	5.91	6.03	6.11
40	80	40	5.10	5.44	5.62	5.83	5.95	6.03
45	85	40	5.10	5.44	5.62	5.83	5.95	6.03
44	85	41	4.96	5.33	5.55	5.74	5.86	5.94
43	85	42	4.81	5.21	5.42	5.66	5.78	5.86
42	85	43	4.63	5.08	5.31	5.56	5.69	5.77
41	85	44	4.45	4.93	5.19	5.46	5.60	5.69
40	85	45	4.24	4.77	5.06	5.35	5.50	5.59
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

For SI: °C = [(°F) - 32] / 1.8

[a] Lift = Entering condenser water temperature °F – Leaving chilled water temperature °F

[b] Condenser DT = Leaving condenser water temperature °F - Entering condenser water temperature °F

$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$

where X = Condenser DT + Lift

$COP_{adj} = K_{adj} * COP_{std}$

TABLE 803.3.2(5)
COPS AND IPLVS FOR NON-STANDARD CENTRIFUGAL CHILLERS > 300 TONS

CENTRIFUGAL CHILLERS > 300 TONS COP_{std} = 6.1								
			Condenser Flow Rate					
			2 gpm/ton	2.5 gpm/ton	3 gpm/ton	4 gpm/ton	5 gpm/ton	6 gpm/ton
Leaving chilled water temperature (°F)	Entering Condenser Water Temperature (°F)	Lift[a] (°F)	Required COP and IPLV					
46	75	29	6.80	7.11	7.35	7.71	7.97	8.16
45	75	30	6.71	6.99	7.21	7.55	7.78	7.96
44	75	31	6.61	6.89	7.09	7.40	7.61	7.77
43	75	32	6.52	6.79	6.98	7.26	7.45	7.60
42	75	33	6.43	6.69	6.87	7.13	7.31	7.44
41	75	34	6.33	6.60	6.77	7.02	7.18	7.30
46	80	34	6.33	6.60	6.77	7.02	7.18	7.30
40	75	35	6.23	6.50	6.68	6.91	7.06	7.17
45	80	35	6.23	6.50	6.68	6.91	7.06	7.17
44	80	36	6.13	6.41	6.58	6.81	6.95	7.05
43	80	37	6.02	6.31	6.49	6.71	6.85	6.94
42	80	38	5.90	6.21	6.40	6.61	6.75	6.84
41	80	39	5.77	6.11	6.30	6.52	6.65	6.74
46	85	39	5.77	6.11	6.30	6.52	6.65	6.74
40	80	40	5.63	6.00	6.20	6.43	6.56	6.65
45	85	40	5.63	6.00	6.20	6.43	6.56	6.65
44	85	41	5.47	5.87	6.10	6.33	6.47	6.55
43	85	42	5.30	5.74	5.98	6.24	6.37	6.46
42	85	43	5.11	5.60	5.86	6.13	6.28	6.37
41	85	44	4.90	5.44	5.72	6.02	6.17	6.27
40	85	45	4.68	5.26	5.58	5.90	6.07	6.17
Condenser DT[b]			14.04	11.23	9.36	7.02	5.62	4.68

For SI: °C = [(°F) - 32] / 1.8

[a] Lift = Entering condenser water temperature °F – Leaving chilled water temperature °F

[b] Condenser DT = Leaving condenser water temperature °F - Entering condenser water temperature °F

$K_{adj} = 6.1507 - 0.30244(X) + 0.0062692(X)^2 - 0.000045595(X)^3$

where X = Condenser DT + Lift

$COP_{adj} = K_{adj} * COP_{std}$

TABLE 803.3.2(6)
PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Sub-Category or Rating Condition	Performance Required as of 10/29/2001[a,b]	Test Procedure[c]
Propeller or axial fan cooling towers	All	95°F (35°C) entering water 85°F (29°C) leaving water 75°F (24°C) wb outdoor air	≥38.2 gpm/hp (3.23 L/s·kW)	CTI ATC-105 and CTI STD-201
Centrifugal Fan Cooling Towers	All	95°F (35°C) entering water 85°F (29°C) leaving water 75°F (24°C) wb outdoor air	≥ 20.0 gpm/hp (1.7 L/s·kW)	CTI ATC-105 and CTI STD-201
Air Cooled Condensers	All	125°F (52°C) condensing temperature R22 Test Fluid 190°F (88°C) entering gas temperature 15°F (8°C) Subcooling 95°F (35°C) Entering Drybulb	≥176,000 Btu/h·hp (69 COP)	ARI 460

For SI: °C = [(°F) - 32] / 1.8, 1 Btu/h = 0.2931W, 1 L/s·kW = 11.8 gpm/hp

[a] For purposes of this table, cooling tower performance is defined as the maximum flow rating of the tower units (gpm) divided by the fan nameplate rated motor power units (hp).

[b] For purposes of this table air-cooled condenser performance is defined as the heat rejected from the refrigerant units (Btu/h) divided by the fan nameplate rated motor power units (hp).

[c] Chapter 9 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

Section 803.3.3.5. Change to read as follows: (EC43-00)

803.3.3.5 Economizers. Economizers shall be provided on each system over 65,000 Btu/h (19 kW) cooling capacity in accordance with Section 803.2.6.

Exceptions:

1. Water economizers that are capable of cooling supply air by direct and/or indirect evaporation and providing up to 100% of the expected system cooling load at outside air temperatures of 50° F (10° C) dry bulb/45° F (7.2° C) wet bulb and below.
2. Systems under 135,000 Btu/h (40 kW) cooling capacity in Climate Zones 3c, 5b, 7, 13b, and 14.

Section 803.3.3.8. Add new section as follows: (EC44-00)

803.3.3.8 Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables 803.3.2(1) through 803.3.2(3).

Section 803.3.4.1. Delete section without substitution, and renumber remaining sections. (EC45-00)

Section 805.2. Change to read as follows: (EC47-00)

805.2 Lighting controls. Lighting systems shall be provided with controls as required in Sections 805.2.1, 805.2.2 and 805.2.3.

Section 805.2.2. Add new section to read as follows and renumber remaining sections: (EC47-00)

805.2.2 Additional controls. Each area that is required to have a manual control shall have additional controls that meet the requirements of Sections 805.2.2.1, 805.2.2.2 or 805.2.2.3.

Exceptions:

1. Areas that have only 1 luminaire.
2. Areas that are controlled by an occupant-sensing device.
3. Corridors, storerooms, restrooms, or public lobbies.

Section 805.2.1.1. Change to read as follows: (EC47-00)

805.2.1.1 Bi Level Switching. Each area less than

250 ft² (23m²) that is required to have a manual control shall also allow the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern by at least 50 percent.

Exceptions:
1. Areas that have only 1 luminaire.
2. Areas that are controlled by an occupant-sensing device.
3. Corridors, storerooms, restrooms, or public lobbies.
4. Guest rooms.

Section 805.2.2.2. Add new section as follows: (EC47-00)

805.2.2.2 Automatic lighting shutoff. Spaces greater than 250 ft² (23m²) in buildings larger than 5,000 ft² (465 m²) shall be equipped with an automatic control device to shut off lighting in those spaces. This automatic control device shall function on either:
1. A scheduled basis, using time-of-day, with an independent program schedule that controls the interior lighting in areas that do not exceed 25,000 ft² (2323 m²) and are not more than one floor, or
2. An unscheduled basis by occupant intervention.

CHAPTER 9

Chapter 9. Change the following referenced standards to read as follows:

AAMA American Architectural Manufacturers Association
1827 Walden Office Square, Suite 104
Schaumburg, IL 60173-4628

AMCA Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004-1806

Standard reference number	Title	Referenced in code section number
AMCA 500-89	Test Methods for Louvers, Dampers, and Shutters	802.3.3

ARI Air Conditioning and Refrigeration Institute
4301 North Fairfax Drive
Suite 425
Arlington, VA 22203

Standard reference number	Title	Referenced in code section number
210/240—94	Unitary Air-Conditioning and Air-Source Heat Pump Equipment	Table 503.2, Table 803.2.2(1), Table 803.2.2(2)
320—98	Water- Source Heat Pumps	Table 803.2.2(2)

325–98	Ground Water- Source Heat Pumps	Table 803.2.2(2)
340/360–93	Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment	Table 803.2.2(1), Table 803.2.2(2)
460–94	Remote Mechanical-Draft Air-Cooled Refrigerant Condensers	Table 803.3.2(6)

ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
1791 Tullie Circle, NE
Atlanta, GA 30329-2305

Standard reference number	Title	Referenced in code section number
62–99	Ventilation for Acceptable Indoor Air Quality	202
90.1-99	Energy Standard for Buildings Except Low-Rise Residential Buildings	503.1, 701.1, 801.2, 802.1, 802.2
ASHRAE–99	HVAC Systems and Applications Handbook	402.3.2, 504.2.2

ASME American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10017

Standard reference number	Title	Referenced in code section number
ASME-PTC 4.1-1964	Steam Generating Units	Table 803.2.2(5)

ASTM American Society for Testing and Materials
100 Barr Harbor Dr.
West Conshohocken, PA 19428-2859

Standard reference number	Title	Referenced in code section number
C236–93^{E1}	Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box	602.1.1.1
E 779–99	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	402.1.3.10

CTI Cooling Tower Institute
530 Wells Fargo, Suite 218
Houston, TX 77090

Standard reference number	Title	Referenced in code section number
CTI ATC-105 (97)	Acceptance Test Code For Water Cooling Towers	Table 803.3.2(6)
CTI-201 (96)	Standard For Certification of Water Cooling Tower Thermal Performance	Table 803.3.2(6)

IESNA Illuminating Engineering Society of North America
120 Wall Street, 17th Floor

New York, NY 10005-4001

Standard reference number	Title	Referenced in code section number
IESNA/ASHRAE 90.1—99	Energy Standard forBuildings Except Low-Rise Residential Buildings	503.1, 701.1, 801.2, 802.1, 802.2

ISO International Standards Organization
1, rue de Varembe,
Case postale 56,
CH - 1211 Geneve 20, Switzerland

Standard reference number	Title	Referenced in code section number
ISO 13256-1 (1998)	Water-Source Heat Pumps — Testing and Rating for Performance — Part 1: Water-to-Air and Brine-to-Air Heat Pumps	Table 803.2.2(2)

NFRC National Fenestration Rating Council, Inc.
Suite 120
1300 Spring Street Park
Silver Spring, MD 20910

Standard reference number	Title	Referenced in code section number
200—97	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence	102.5.2, 601.3.2, 601.3.2

UL Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

Standard reference number	Title	Referenced in code section number
181A—94	Closure Systems for Use with Rigid Air Ducts and Air Connectors — with Revisions thru December 1998	503.3.3.4.3, 803.2.8

Appendix Detail 502.2.1.5(2). Delete Dimension "B" and the text"A+B = 12" Minimum". (EC24-00)

Appendix Detail 502.2.1.5(3). Delete without substitution. (EC24-00)